10 February 1964

RESEARCH OBJECTIVE

MULTI-SENSOR IMAGERY RESEARCH: (Around-the-Clock Aerial Surveillance of Target Activity Levels in a Suspected Military Build-up)

(PHASE I)

1. INTRODUCTION.

Research is proposed to determine the most effective techniques of using sequential day and night imagery (from a combination of camera [redacted] 25X1 [redacted] 25X1 to determine changes in target activity. More specifically, the proposed project would seek to simulate acquisition and analysis of changing activity levels of certain targets which are indicators of military "build-up." It should be emphasized that this research is not directed toward imagery acquisition methods, but to the problem of imagery analyses and exploitation techniques. The acquisition phase of this project would provide imagery taken under rigidly controlled conditions -- to be used in developing objective exploitation techniques.

[redacted] 25X1

2. CONCEPT.

2.1. Purpose. There are two primary objectives of the proposed research:

2.1.1. To determine the significance and value of [redacted] 25X1 in augmenting conventional aerial photography as they both might be used for determining the location and rate of military activity over a period of time;

2.1.2. To devise guidelines that will assist interpreters in their use of sequential photo [redacted] for military "build-up" analyses. 25X1

2.2. Scope. This project will encompass several separate but coherent activities, as listed below:

2.2.1. Data Acquisition: Collection of aerial photography, [redacted] 25X1 imagery and complete ground truth of seven targets over a period of seven days and nights.

2.2.2. Imagery Interpretation: Detailed interpretation of targets' activity on aerial photography alone and then on photography [redacted] in the sequence flown, but without ground truth. 25X1

2.2.3. Data Analysis: Comparison of interpreted data with ground truth data to determine the significance and additive value of infrared for target activity-level analysis.

2.2.4. Methods Development: Derivation and presentation of guidelines to assist interpreters of sequential imagery in their analysis of target activity levels and military build-up.

There is strong opinion that the tasks required for the data acquisition phase of this project should be performed separately and by a group other than the one performing the subsequent interpretation, analysis, and methods development tasks. This will not only assure complete objectivity of conclusions but will more nearly simulate actual operational conditions. Therefore, the imagery interpretation, data analysis, and methods development phases will be performed in-house and/or by a separate contractor. Only those requirements relating to the data acquisition phase are listed below.

3. SPECIFICATIONS.

3.1. Data Acquisition Requirements.

3.1.1. Aircraft. The contractor shall provide an aircraft and crew capable of fulfilling the project requirements as stated below.

3.1.2. Aerial Photography. Complete vertical photographic coverage of each target area shall be obtained between 0900 hours and 1500 hours (local time) each day for seven consecutive days.

The camera used must be a high quality reconnaissance or cartographic type capable of providing large scale (1:5000 or larger) high quality photography.

Since stereo is essential, 60% forward overlap is a rigid requirement. If more than one flight-line is necessary to cover a target, side-lap coverage should be at least 10% of the format width.

A ground resolution target shall be photographed each day at some point of that day's flight.

The film shall be a high-quality panchromatic emulsion. A gray-level step wedge shall be attached to the end of each roll of unexposed film as an aid for calibrating subsequent processing. Film shall be processed according to high-quality laboratory procedures. One complete set of negatives, duplicate positive transparencies and paper prints shall be delivered. All photography shall be adequately identified and titled with target, date, time and altitude of acquisition. Accurate flight-line plots shall accompany all photography.

[redacted] 25X1

25X1

3.1.4. Ground Truth Data. In order to fulfill the research objectives, it is extremely important that complete, accurate, and fully documented data on the actual target conditions be gathered at the time of imagery acquisition. It is realized that collection of the necessary ground truth is a difficult task and requires considerable personnel commitment; however, this data is probably the most essential information for objective analysis of the total problem. Listed below are the required essentials of ground truth:

3.1.4.1. Complete U. S. Weather Bureau hourly reports from the weather station(s) nearest the area of targets. These reports shall cover a period from 24 hours prior to the first infrared mission through, and including, the last infrared mission. They should include at least: air temperature, precipitation, wind, cloud cover present, cloud levels and dew point. Also to be included are the times of official sunset and sunrise for each day of operation.

25X1

3.1.4.4. Port Authority logs, airport logs, and other similar target data which is normally maintained on the status of the various target areas.

3.1.4.5. A full analysis of all exposed materials in each target area. This should be accomplished before imagery acquisition since this data would be quite useful in planning the location of subsequent temperature measurement. These analyses should result in seven target maps (color-coded or zip-coded) to indicate the different surface materials in each target area. ("Materials" are defined as: concrete roof, aluminum roof, sod, grass, soil, blacktop road, water, etc.)

3.1.4.6. Complete documentation of all ground truth data which has been collected shall be presented in the final technical report along with a description of the acquisition of all photography [redacted] All parameters 25X1
of each flight of photography and imagery -- e.g., time over each target, altitude, etc. -- should be identified. A complete description of the technical characteristics of the camera [redacted], as well as a description 25X1
of how each roll of film was developed and reproduced, shall be included. Three copies of the final Technical Report are required.

3.1.4.7. All photography, [redacted] and ground truth data shall 25X1
become the property of the United States Government.

3.1.5. Targets. There are seven target types which are considered as representative of military "build-up" indicators. The target types are:

3.1.5.1. a port and its associated facilities

3.1.5.2. a large railroad yard

3.1.5.3. a civilian airport
3.1.5.4. a storage depot
3.1.5.5. a trucking terminal
3.1.5.6. a military motor pool
3.1.5.7. an unspecified facility or installation under rapid construction

Proposals for the data acquisition should include recommendations of specific, existing installations of the above types. Final selection and delineation of installations to be used in this project shall be approved by the Government Project Monitor. For maximum efficiency of aircraft time and ground truth collection, the selected installations should each be characteristic of their type yet compact in area. And, it would be advantageous if they should all be in the same approximate area (such as in one metropolitan area). They should also be installations with some degree of activity around-the-clock -- preferably with changing rates of activity.